

2016 UDOT RESEARCH PROBLEM STATEMENT

*** Problem statement deadline is March 14, 2016. Submit statements to Tom Hales at tahales@utah.gov. ***

Title: Concrete Barriers with Self-Consolidating Concrete and Glass FRP Bars

No. (office use): 16.02.01

Submitted By: Chris Pantelides

Organization: University of Utah

Email: c.pantelides@utah.edu

Phone: 801-585-3991

UDOT Champion (suggested): Lloyd Neeley

Select One Subject Area

☒ Materials/Pavements

☒ Maintenance

☐ Traffic Mgmt/Safety

☐ Preconstruction

☐ Planning

1. Describe the problem to be addressed.

Wear of Jersey Barriers attributed to salt corrosion from snow plow operations has been observed. For precast barriers, this consists of concrete delamination, spalling and vertical cracking; in addition, the braided cable connectors where two barriers are pinned together is rotting out. For cast-in-place barriers, patches of concrete popping out at the bottom of the barriers, as well as some severe spalling on top of the barriers and major vertical cracking has been observed. In the proposed research, self-consolidating-concrete (SCC) along with Glass Fiber Reinforced Polymer (GFRP) bars and hooks are proposed to construct the barriers and connect them.

2. Explain why this research is important.

GFRP bars are noncorrosive and thus will not rust; they are expected to last for a very long time. SCC provides greater homogeneity of distribution of in-place compressive strength, it is more stable than the conventionally vibrated concrete and has been shown to provide considerably greater ductility than barriers made with conventional concrete.

3. List the research objective(s):

1. The major objective is to produce long lasting barriers
2. The barriers must withstand harsh environments in terms of corrosion
3. The barriers must be able to withstand static loads after corrosion exposure
4. The barriers must be able to withstand impact loads

4. List the major tasks:

1. Environmental test of barriers built with SCC reinforced with epoxy coated steel bars (Specimen 1) and GFRP bars (Specimen 2) under salt water solution
2. Static tests of Specimen 1 and Specimen 2 and corresponding control specimens (Specimen 3 and Specimen 4)
3. Impact tests of jersey barriers built with SCC reinforced with epoxy coated and GFRP bars (Specimen 5 and Specimen 6)

5. List the expected results:

1. Better performance of corroded GFRP reinforced barriers under static tests
2. Better performance of GFRP reinforced barriers under impact tests

6. Describe how this research will be implemented.

Better jersey barriers that are long lasting.

7. Requested from UDOT: \$50,000

Other/Matching Funds: \$0

Total Cost: \$50,000

8. Outline the proposed schedule, including start and major event dates.

The research will last one year. The corrosion research will last 4 months, the static tests will take the next four months and the impact test the final four months.

Start date: June 1, 2016

Build jersey barriers: June 2016

Start environmental corrosion tests: July 2016

End environmental corrosion tests: September 2016

Static tests: October 2016

Impact tests: February 2017

Final Report: June 2017